

***COUPLING BETWEEN OCEANIC UPWELLING AND CLOUD-AEROSOL
PROPERTIES AT THE AMF POINT REYES SITE***

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ABSTRACT

Cloud microphysical properties measured at the ARM Mobile Facility site located on the northern coast of California near Point Reyes, during the 2005 Marine Stratus Radiation, Aerosol and Drizzle experiment, were analyzed to determine their relationship to the coastal sea surface temperature (SST) which was characterized using measurements acquired from a National Oceanic and Atmospheric Administration offshore buoy. An increase in SST resulting from a relaxation of upwelling, occurring in the eastern Pacific Ocean off the coast of California in summer is observed to strongly correlate with nearby ground measured cloud microphysical properties and cloud condensation nuclei (CCN) concentrations. Correlations between these atmospheric and oceanic features provide insight into the interplay between the ocean and cloud radiative properties. We present evidence of this robust correlation and examine the factors controlling these features.

The marine boundary layer is in direct contact with the sea surface and is strongly influenced by SST. Moisture and vertical motion are crucial ingredients for cloud development and so we examine the role of SST in providing these key components to the atmosphere. Although upwelling of cold subsurface waters is conventionally thought to increase aerosols in the region, thus increasing clouds, here we observed a relaxation of upwelling associated with changes in the structure of marine stratus clouds. As upwelling relaxes, the SST get warmer, thick clouds with high liquid water paths are observed and persist for a few days. This cycle is repeated throughout the summer upwelling season. A concomitant cyclic increase and decrease of CCN concentration is also observed. Forcing mechanisms and large-scale atmospheric features are discussed. Marine stratocumulus clouds are a critical component of the earth's radiation budget and this site provides an excellent opportunity to study the influence of SST on these clouds.

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